CN801 INTRODUCTION TO TIME SERIES ANALYSIS 4-0-0-4

Definition of a time series – The need for time series analysis – variables and data – graphs and distributions – measures of center and spread – normal distribution – z-scores – correlation – functions –hypothesis testing – confidence interval and errors – t-test – chisquare test – goodness of fit – test for independence – ANOVA – introduction to design of experiments - random samples – sample statistics and population statistics – regression analysis – regression models – method of least squares –data reduction – Time Series Analysis – AR models – ARMA models – ARIMA models – Basics of nonlinear TSA – Reconstruction of phase space – Embedding dimension – Time delay – Correlation dimension – Correlation entropy – Multifractal Detrended Fluctuation Analysis – Surrogate analysis – Tests for determinism – Complex network representation – Network topology – Prediction of transitions.

TEXTBOOKS/ REFERENCES:

1. Basic skills in Statistics: A Guide for Healthcare Professionals. Cook, A., Netuveli, G. and Sheikh, A. Class Publishing (London) (2004).

2. Basic Statistics: Understanding conventional methods and modern insights. Wilcox, R. R. Oxford University Press (2009).

3. Basic Statistics for the behavioural sciences. 6th edition. Heiman, G. W. Wadsworth (2011).

4. Introduction to Time Series and Forecasting (Springer Texts in Statistics) 2nd Edition. Brockwell, P. J. & Richard, A. D (1991).

5. Introduction to Engineering Statistics and Six Sigma. Allen, T. T. Springer – Verlag (London) (2006).

6. Statistical Design and Analysis of Experiments: With Applications to Engineering and Science. 2nd Edition. Mason, R. L., Gunst, R. F. and Hess, J. L. Wiley-Interscience (2003).

7. Time Series: Theory and Methods (Springer Series in Statistics) 2nd edition. Brockwell, P. J. & Richard, A. D (1991).

8. Applied Nonlinear Time Series Analysis (World Scientific Series on Nonlinear Science). Series A, Volume 52, Michael Small (2005).

9. Nonlinear Time Series Analysis, Cambridge University Press, 2nd Edition, Schreiber, T (2003).

10. Networks : An Introduction (Oxford University Press), Newman, M (2008).